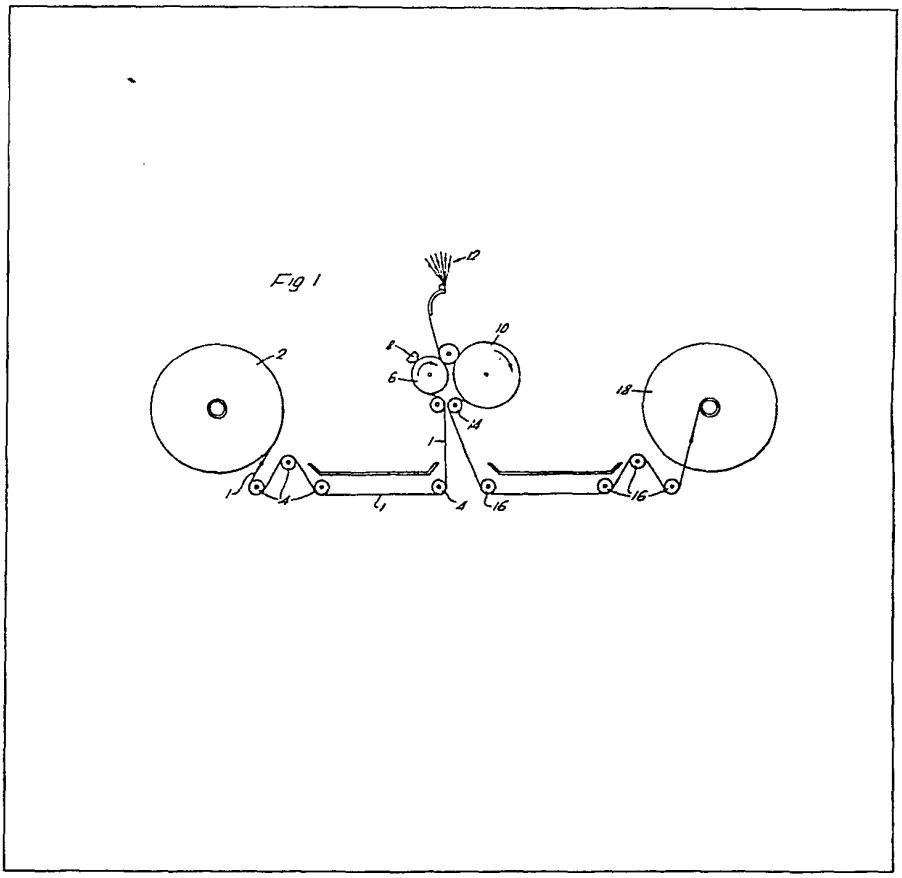
(12) UK Patent Application (19) GB (11) 2 024 711 A

(21) Application No **7921717**
(22) Date of filing **21 Jun 1979**
(23) Claims filed **21 Jun 1979**
(30) Priority data
(31) **11213/78**
(32) **21 Mar 1978**
(33) **United Kingdom (GB)**
(43) Application published
16 Jan 1980
(51) **INT CL³**
B32B 5/02 29/02 31/20
(52) Domestic classification
B5N 0502 2902 3120
(56) Documents cited
GB 1508863
GB 1380608
GB 1328524
GB 1308075
GB 1302283
GB 1259022
GB 1233015
(58) Field of search
B5N
(71) Applicant
Kamini Kichlu,
76 Wood Vale,
London N.10.
England.
(72) Inventor
Kamini Kichlu
(74) Agents
Lloyd Wise, Bouly & Haig

(54) **Manufacture of laminates**

(57) A method of preparing a laminate e.g. a wallcovering comprising substantially parallel fibres adhered to a flexible backing sheet in which the flexible backing sheet (1) e. g. paper having a layer of a heat softenable adhesive in the softened state is caused to pass partially around and in contact with a cooled roll (10) with the adhesive layer outermost to set the adhesive whilst parallel filaments (12) are drawn partly around said role in contact with the softened adhesive layer and under tension such that the filaments are forced into contact with the softened adhesive layer before the adhesive sets. An apparatus for effecting the method is described.



GB 2 024 711 A

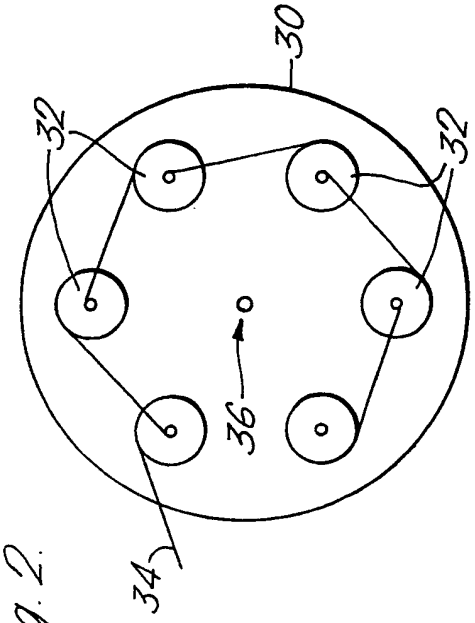


Fig. 2.

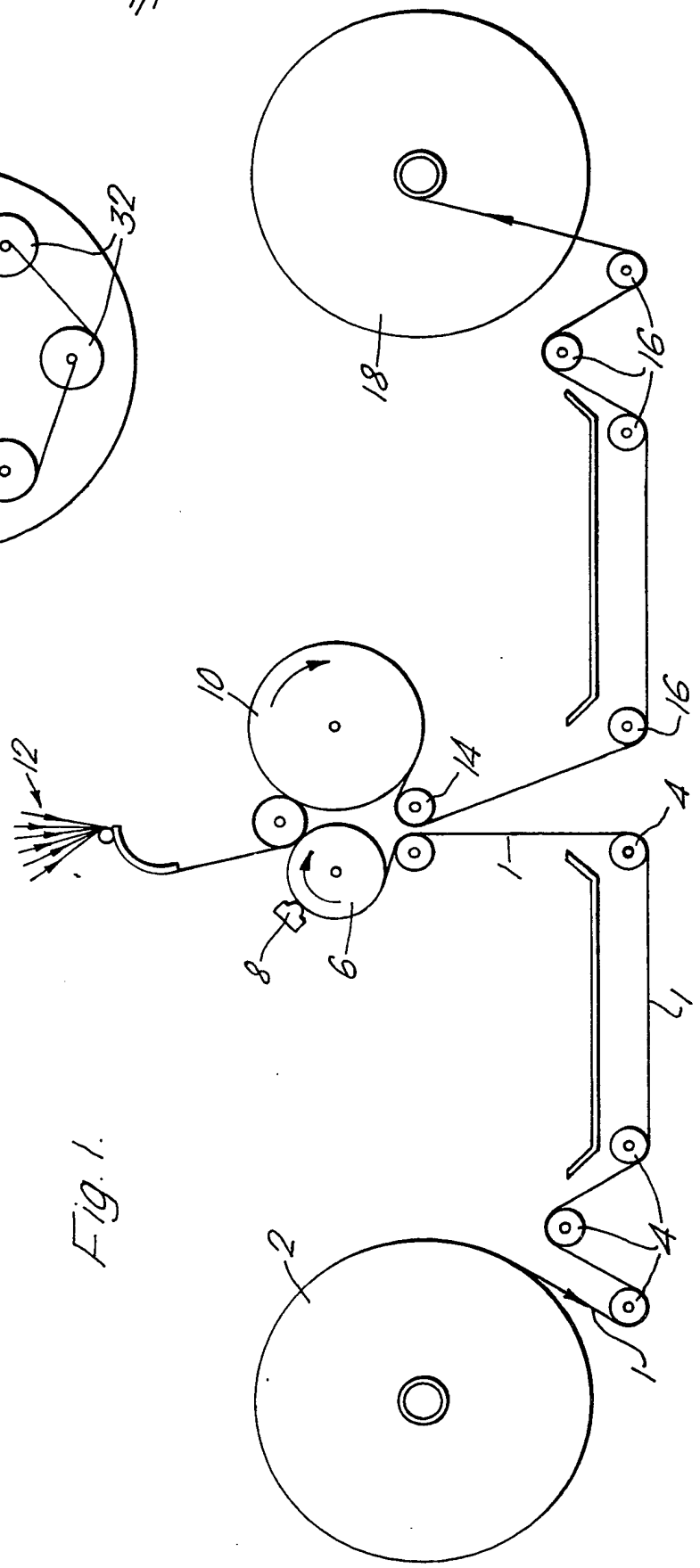


Fig. 1.

SPECIFICATION

Preparation of laminate materials

This invention relates to the preparation of laminates comprising substantially parallel fibres adhered to a flexible backing. In a preferred embodiment the invention relates to the preparation of decorative wall coverings.

Decorative wall coverings consisting of a backing sheet to which has been adhered parallel lengths of fibres are known. In one type of wall covering lengths of spun yarn are packed very closely side by side so as to cover and mask the whole area of the backing sheet. In a further type of wall covering spaced parallel lengths of irregular yarn, such as snarled, brushed, raised, bouclé or knotted yarn are adhered to the backing. Such yarns may be spaced apart without there appearing to be gaps through which the backing is readily apparent and much less yarn is required than with the close packed fibres. In addition interesting and attractive patterns may be obtained by the regular or random disposition of the yarns.

The wall coverings may be prepared by aligning the yarns on an adhesive coated on one face of a backing sheet and passing the resulting sandwich into the nip of a pair of rollers to press the yarns into the adhesive and allowing the adhesive to set. This method, however, suffers from the disadvantage that when yarns of different thickness are used the rollers do not exert sufficient pressure on all the yarns and while the thicker yarns are pressed into the adhesive to obtain a good bond, the thinner yarns tent to be only loosely bonded. Increasing the pressure between the rollers tends to flatten and deform the thicker yarns.

The present invention has been made with the above points in mind.

Therefore according to the invention there is provided a method of laminating substantially parallel filaments to a flexible backing sheet having a layer of heat softenable adhesive on one surface thereof, in which the backing sheet with the adhesive in the softened state is caused to pass partly around and in contact with a cooled roll with an adhesive layer uppermost to set the adhesive whilst parallel filaments are drawn partly around said roll in contact with the softened adhesive layer and under tension such that the filaments are forced into contact with the softened adhesive layer before the adhesive sets.

The invention allows yarns of varying thickness to be simultaneously adhered to the backing sheet with a good firm bond. Instead of relying on the nip between a pair of rollers to force the yarn in contact with the adhesive the backing paper with activated adhesive and yarns are drawn around a cooled roller or drum on which the adhesive coated backing is wound under tension so that the yarns are forced in contact with the adhesive before and preferably during the setting of the adhesive.

The backing material must be flexible and may be a fabric but is preferably paper which is both cheap and flexible. A preferred type of paper is one which has a high wet strength and which is a creped paper e.g. a single or double creped paper i.e. Clupak high wet strength paper.

The yarns may be regular and/or irregular and may be made from any fibres, e.g. natural or synthetic fibres or mixtures thereof. Examples of fibres are wool, synthetic polyamides, glass fibres, crushed mohair, ramie, cashmere, camel, angora, sisal, manilla hemp, jute and carbon fibres.

The adhesive used in the invention is a hot melt adhesive e.g. a polyamide or a polyurethane. The paper may be precoated with adhesive and the adhesive softened prior to lamination or preferably the adhesive is applied to the backing in the molten state and set on contact with the cooled roller and yarns.

The invention will now be illustrated with reference to the accompanying drawings in which:

Figure 1 represents a diagrammatic view of a laminating apparatus for use in the invention, and

Figure 2 represents a multi-spool creal for use in the invention.

Referring to Figure 1, the backing paper 1 is fed from a roll 2 over a series of guide rollers 4 to a driven roller 6 and hot molten adhesive is applied to the backing by an adhesive coater 8. The adhesive coated paper is then drawn around and in contact with the driven cooled drum 10 which may be cooled by passing cold water through its interior. Parallel yarns 12 are drawn in contact with the adhesive on the backing around the driven cooled drum 10 so that they are forced in contact with the adhesive before and during the setting of the adhesive. The backing and yarns are held in place around the cooled drum by the roller 14. After the adhesive has set the resulting laminate is wound on a drum 18 after passage through guide rollers 16.

The adhesive coater 8 may operate at speeds up to 50m/minute applying a coating weight of adhesive of about 25 to 40g per square metre. The coating speed is generally of the order of 30m/min and the coating weight adjusted according to the speed and types of yarn used. The melted resin is kept hot in a trough and applied by a roller. The resin may be melted in a melting unit e.g. a Mercor-Meltex Hot Melt unit and transferred to the trough through a dual heated hose.

When preparing the wall coverings a large number of warp yarns are arranged in parallel rows on the backing. Any knots in the yarns are unsightly as they mar the decorative effect and therefore those lengths of laminate formed with too many knots must be discarded. This problem is particularly prevalent when yarns of various thickness are used as spools of yarn tend to be made up by weight and not length and therefore the knots in the yarns made when two lengths are joined occur at different places for different yarns. The wastage with such materials can be as high as 50% I have found that this problem is obviated by using spools having the same length of yarn e.g. 100 metres and therefore the knots formed by joining lengths of yarn all occur at about the same point on the backing material thus reducing the wastage.

When operating at high speeds with several yarns a smooth and simple warp feed is necessary. There

must be a continuous supply of each yarn which is guided to the cooled laminating roll. Each yarn is fed from spools mounted on a creal. Conventional creals normally contain two spools joined top-tail and when one spool has been used it is replaced by a fresh one which is knotted top-tail to the other. I have found that the use of two spools on a creal is not sufficient to keep up with the laminating speed as continual changing of spools is required and therefore a multi-spool creal is preferably utilized. Figure 2 depicts a multi-spool creal 30 which has a plurality of spools 32 joined top-tail with adjacent spools, one end of the yarn 34 being led off to the warp feed. The creal is rotatable about an axle 36 and may be automatically rotated as a spool is used to maintain even feed of the yarn. Thus a single creal may hold sufficient spools to allow for a long period of lamination and several spools may be replaced at a time rather than after every spool is used. The creal may operate with both cylindrical and conical spools. In an alternative multi-spool creal and the spools are top-tailed and each inclined towards a lead off point. Thus as one spool is finished and the next one is started there is no need to rotate the creal as even feed of the yarn is maintained. In one such arrangement the spools may be inclined towards the apex of a cone.

The warp feed means for guiding the yarns to the backing may simply comprise a slotted guide together with one or more rollers to ensure there is sufficient tension when the yarns are drawn around the cooled drum to urge the yarns in contact with the adhesive. The slotted guide has a number of channels or corrugations so that a single yarn may be positioned in each slot. The size of the slots may vary according to the different yarns used. If necessary eyelets e.g. of ceramic material may also be used to guide the yarns along the correct path. The rollers used to provide the correct tension may be coated with various compounds to facilitate their function e.g. one or more rollers may be coated with Teflon. At least one of the rollers is driven to feed the yarns from the creals. In a preferred arrangement such a roller is linked to the main drive of the machine so that if a yarn breaks or snarls the yarn feed and laminating rollers may be instantly stopped until the fault is corrected.

The yarns may be fed from the creals to the warp feed through a series of tubes e.g. of metal or plastics material. The tubes are preferably arranged such that the path length for each yarn from the creal to the laminating point is identical so that all the knots joining the lengths of yarns occur at substantially the same place on the laminated material.

The laminated decorative wall covering may conveniently be trimmed to size directly after lamination. For example the cool d drum may be provided with groov s or recesses each of which co-operate with a rotating cutting blade and the edges of the laminate material may be automatically trimmed while the material is still under tension. Alternatively a separate roller and cutting device may be included in the system prior to rolling on the collecting drum.

The layout of the apparatus is not limited to that depict d in Figure 1. I have found that when the large multi-spool creals are used with a large number of yarns it is preferably to have the feed and collecting drum (2 and 18) on the same side of the driven cooled drum in order to allow sufficient space and access to the creals and warp feed. Such a layout may be achieved by a simple arrangement of guide rollers to guide the backing to the adhesive coater.

Whilst the invention has been particularly described with reference to the production of wall coverings it is equally applicable to the preparation of any laminate materials comprising a flexible backing to which parallel warp filaments are adhered. Such laminate materials include packaging materials in which the backing is paper or flexible card.

CLAIMS

1. A method of laminating substantially parallel filaments to a flexible backing sheet having a layer of heat softenable adhesive on one surface thereof, in which the backing sheet with the adhesive in the softened state is caused to pass partly around and in contact with a cooled roll with an adhesive layer uppermost to set the adhesive whilst parallel filaments are drawn partly around said roll in contact with the softened adhesive layer and under tension such that the filaments are forced into contact with the softened adhesive layer before the adhesive sets.

2. A method as claimed in Claim 1 in which the filaments comprise yarns, some of which have a different thickness to others.

3. A method as claimed in Claim 1 or Claim 2 in which the flexible backing sheet comprises paper having a high wet strength.

4. A method as claimed in any preceding claim in which the adhesive is a hot melt adhesive.

5. A method as claimed in Claim 4 in which the adhesive is a polyamide or polyurethane.

6. A method as claimed in any preceding claim in which the adhesive is applied prior to lamination.

7. A method as claimed in any one of Claims 1 to 5 in which the flexible backing sheet is precoated with adhesive and the adhesive is softened prior to lamination.

8. A method as claimed in any preceding claim in which the coating weight of adhesive is in the range 25 to 40 g per square metre.

9. A method as claimed in any preceding claim in which the filaments are fed to the roll from spools, each of which have the same length of filament, the path length of filaments from each spool to the roll being substantially constant.

10. A method as claimed in Claim 9 in which the spool for a filament is held on a multi-spool creal, the spools being connected and arranged so that as one spool is finished a spool is started in order to supply a continuous feed of filaments.

11. A method as claimed in any preceding claim in which the laminate material which is formed is trimmed by rotating cutter blades co-operating with grooves provided in the cooled roll.

12. A method of laminating substantially parallel filaments to a flexible backing sheet substantially as herein described with reference to the accompany-

ing drawings.

13. Apparatus suitable for use in a method as claimed in Claim 1 comprising means for suppling a flexible backing sheet, means for coating one surface of said sheet with a molten adhesive, means for supplying a plurality of parallel fibres and a cooled roll and associated rollers constructed and arranged to convey said cooled flexible backing sheet around at least a portion of the cooled roll with the adhesive outermost together with said parallel filaments under tension to force them into contact with the adhesive.

Printed for Her Majesty's Stationery Office by Croydon Printing Company Limited, Croydon Surrey, 1980.
Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.